THURSDAY, AUGUST 9, 1888.

THE ZOOLOGICAL RESULTS OF THE "CHALLENGER" EXPEDITION.

Report on the Scientific Results of the Voyage of H.M.S. "Challenger" during the Years 1873–76, *under the command of Captain George S. Nares, R.N., F.R.S., and the late Captain Frank T. Thomson, R.N.* Prepared under the superintendence of the late Sir C. Wyville Thomson, Knt., F.R.S., and now of John Murray, one of the Naturalists of the Expedition. Zoology—Vols. XXIII., XXIV., and XXV. (Published by Order of Her Majesty's Government, 1888.)

THE first two memoirs in Vol. XXIII. are Reports on the Pteropoda by Dr. Paul Pelseneer. Dr. Pelseneer's Report on the Gymnosomatous division of the Pteropods was published in Vol. XIX., and we now have his Report on the Thecosomata and one on the anatomy of the whole group.

In the first of these Reports all the certainly genuine species at present described are enumerated, and full details are given about all those which have been more or less imperfectly described. As the diagnoses of the families and genera of the Pteropods seem to have been copied from originals of a comparatively early date and without modification, it has been necessary on re-study to re-write these, so as to bring them up to the level of scientific accuracy. This monographic study of the subgroup of the Thecosomata has been based not only on the collections made by the *Challenger*, but on those in the British and Brussels Museums, as well as those of several private collections. Like the Gymnosomata, these Thecosomata are pelagic Mollusks, which descend to certain depths to avoid too bright a light, and reascend to the surface of the water when the light is feeble or absent, and when the sea is calm. With a less highly organized alimentary system than the Gymnosomata, the Thecosomata content themselves with humble prey, feeding mainly on Radiolaria, Foraminifera, Infusoria, and even on some of the lower Algal forms.

The Thecosomata were taken alive at seventy different stations, and while they include twenty-eight species, representing all the known genera, they have all been already described. Of those dredged from the deep sea, where "Pteropod ooze" was found, some twenty-four species could be distinguished, of which one was new to science. The total number of Thecosomata now known amounts to forty-two.

While the generic titles given to living forms amount to thirty-four, these can well be included, according to the author, in the following eight:—

Limacina, Cuvier.
Peraclis, Forbes.
Clio, Linn.
Cuvierina, Boas.
Cavolinia, Abildgaard.
Cymbulia, Peron and Lesueur.
Cymbuliopsis, gen. nov.
Gleba, Forskal.

In an appendix to the account of the species of the first two of these genera, some account is given of the forms described by A. Adams as *Agadina stimpsoni*, and *A. gouldi*, which are proved to be Gastropod larvæ.

Shells of Thecosomata have not been found in a greater depth than 1950 fathoms. Mr. J. Murray attributes this to the greater proportion of carbon dioxide in the water at greater depths, and to the more rapid solution of the delicate shells in sea-water under great pressure.

The third part of Dr. Pelseneer's Report treats of the anatomy of the whole of the Pteropods. With it this Report is now the most comprehensive treatise in existence on the group. As a result of his studies he regards the Pteropods as forming not a primitive group, but, on the contrary, a recent and specialized one—a terminal group. There are in it but a small number of species; these exhibit only a slight variability, and they are profoundly modified in adaptation to a special mode of existence.

Since the days of Cuvier the Pteropoda have been regarded as forming a distinct class among the Mollusca, of the same value as the Cephalopoda, Gastropoda, &c.; but Dr. Pelseneer regards it as proved that they are but Gastropods, in which the adaptation to pelagic life has so modified their external characters as to give them an apparent symmetry; that even among the Gastropods they do not constitute a distinct sub-class, nor even an order, that they belong to the Euthyneura, and among these to the Pectibranchiate Opisthobranchs, differing less from these than they differ from the other Opisthobranchs. The Thecosomata and Gymnosomata are two independent groups, not having a common origin, the former having descended from the Bulloidea, and the latter from the Aplysioidea.

These Reports are illustrated with seven plates.

The third Report in this volume is by Prof. G. J. Allman, forming the second part of his memoir on the Hydroida. The author has taken advantage of the opportunity afforded by the typical character of the collection to make it the basis of a general exposition of Hydroid morphology, and this from the present standpoint of our knowledge, so that this Report is not a mere mass of descriptive and distributional details, but one which will have an abiding interest for the biologist.

The rare occurrence in the collection of British species is striking. and would seem to indicate a peculiar definiteness in the geographical distribution of the Hydroids.

The few Gymnoblastic Hydroids in the collection belong to three genera—Stylactis, Eudendrium, and Monocaulos; the species (*M. imperator*), by which the last genus is represented, being perhaps the most remarkable Hydroid obtained during the Expedition. The stem, though only half an inch in thickness, was 7 feet in height, the hydranth extending, from tip to tip of the tentacles, to a width of 9 inches, so that, as regards size, all other Hydroids sink into insignificance when compared to it; while the depth of about 4 statute miles from which it was brought up adds to the special interest of this marvellous animal.

The families of the Calyptoblastea were numerously represented in the collection, and among those of which few examples had hitherto been known are those to which belong the genera Cryptolaria and Grammaria, as well as a new and interesting genus, Perisiphonia. Idia, hitherto only known by the poor description and figure of Lamouroux, proved, on the examination of good specimens of the only species, *I. pristis*, Lamx., to be constructed on a type quite unique among the Hydroida.

Among other families largely represented was that of the Haleciidæ, with not only many new species, but with a new genus, marked by the phenomenon that the colony is provided with bodies which admit of close comparison with the sarcostyles and sarcothecæ of the Plumularinæ.

The curious genus Synthecium, in which the gonangia spring from within the cavity of the hydrotheca, is represented by two new species, both from the Australian seas. There also occur fine examples of the remarkable genus Thecocladium, in which every branch of the colony springs, like the gonangium in Synthecium, from within the cavity of the hydrotheca.

As regards the classification of the Hydroida, the author acknowledges that the time for a complete system has not yet come, such a one should include not only all Hydroid trophosomes with their associated gonosomes; but all the existing Hydromedusæ should have been traced to their respective trophosomes, there are however many of these Hydromedusæ not so traced, though we may be certain that their trophosomes exist. Of those Hydromedusæ into whose life history a polypoid term has never apparently been intercalated, a separate and well defined group must be formed. Thus the sub-orders may be neatly defined as:—(1) *Gymnoblastea.* No hydrothecæ or gonangia. Nutritive zooids when more than one forming permanent colonies Planoblasts in the form of Anthomedusæ. (2) *Calyptoblastea.* Hydranths protected by hydrothecæ. Sexual buds protected by gonangia. Nutritive zooids forming permanent colonies. Planoblasts in the form of Leptomedusæ. (3) *Eleutheroblastea.* No hydrothecæ or gonangia. Nutritive zooids not forming permanent colonies. No differentiated gonophores. (4) *Hydrocorallia.* A calcareous corallum (cœnosteum) permeated by a system of ramified and inosculating cœnosarcal tubes from which the hydranths are developed. (5) *Monopsea.* Free Hydromedusæ which are developed directly from the egg without the intervention of a polypoid trophosome. Auditory clubs with endodermal otolites on the umbrella margin, and (6) *Rhabdophora* (Graptolites). Hydranths replaced by sarcostyles. Hydrocaulus traversed by a chitinous longitudinal rod.

Thirty-nine plates accompany this portion of Prof. Allman's memoir, the enlarged figures on these are all from the pencil of the author, while the figures representing the forms of their natural size have been for the most part drawn from the specimens by Miss M. M. Daniel, and transferred to the stone by Mr. Hollick.

The Report taken in connection with the previously published one on the legion of the Plumularinæ constitutes a most comprehensive and valuable history of the Hydroids for which all biological students will feel their indebtedness to the author.

The fourth Report is on the Entozoa, by Dr. O. von Linstow of Göttingen. The number of Entozoa collected was but small, and chiefly from the alimentary tract of birds; four new species of Ascaris, three of Filaria, and one of Prothelmins, among the Nematodes, four species of Tænia, and two of Tetrabothrium among the Cestoids, are described and figured in the two plates accompanying the Report.

The fifth Report, also a short one, is by Edgar A. Smith, on the Heteropoda. Although no new species are described, several are indicated of which the material was not sufficient to enable the form to be described with certainty.

A most useful and wonderfully complete synonymic list of all known forms of the group is given, and this Report will be found of the greatest value to all interested in the Heteropods.

Vol. XXIV. contains the Report, by C. Spence Bate, F.R.S., on the Crustacea Macrura, or rather on the larger portion of those found during the Expedition. This Report forms a volume of over 1030 pages, which is bound up separately from the 157 lithographic plates; and in the preparation of this great and laborious work and its illustrations Mr. Spence Bate has occupied all his leisure during the last ten years.

Of the enormous mass of detail in this volume it would be impossible to give within our limits any intelligible account; not only are the generic and specific diagnoses given with minute accuracy, but we are, in addition, favoured with a deeply interesting account of all that is known as to the developmental stages of the species; for this latter purpose the notes and drawings from life of the late Dr. Willemoes Suhm have been largely and most properly used. The extreme imperfection of the records of the life-history of even some of our well-known forms is strongly insisted upon, and we would call attention to the subject in the hope that we may direct the energies of some of our younger biologists to this fertile field of research.

The great and recognized experience of the author in all that concerns this section of the Crustacea makes his opinions, founded on so large a knowledge, as to the classification thereof, of importance. Accepting the divisions of this sub-order of the Decapods, called by Huxley Trichobranchiata and Phyllobranchiata, though with a slightly different arrangement of some of the families, the author follows Dana in placing the Penæidea in a separate division, with the name Dendrobranchiata, "while the Squillidæ, Mysidæ, &c.—that is, the Schizopoda originally, and later the Stomapoda of Latreille, Milne Edwards, and De Haan—are arranged under the head of Anomobranchiata, which term was first used by Dana and afterwards by Heller; it has therefore priority of date, and is less liable to misconception than the term Abranchiata" of Huxley (p. 6). Afterwards we find, on a review of the forms included under the Dendrobranchiata, that the Schizopoda may be regarded as an aberrant group of this tribe. Prof. Sars, who, it will be remembered, described the Schizopoda of the *Challenger* Expedition ("Zool. Reports," Part 37) thought "it more appropriate for the present to assign to this group the rank of a distinct tribe or sub-order, there being several well-marked characters distinguishing these Crustacea rather sharply from all other known Decapods." Mr. Spence Bate, however, thinks "that with the exception of the variable condition of the pereiopoda, the several genera do not possess a single character that is not held in common with some genus of the Macrura," and concludes from excellent reasons given in detail "that the natural position of these animals is that of an aberrant tribe of the Dendrobranchiata, more nearly allied to the degraded forms of the Penæidea than to those of any other group" (p. 472).

Each of the three divisions of the Macrura are divided into two sections—the Aberrantia and the Normalia. In the former section of the Trichobranchiata the family Galathæidæ occurs, which will form the subject of a Report yet to appear by Prof. J. R. Henderson.

The group Aberrantia of the division Phyllobranchiata consists of several tribes and families that in their adult condition approach more nearly to the characters common to other divisions, but which nevertheless during the progress of development pass through a stage common to the normal Phyllobranchiate Macrura. This aberrant group has long been known to biologists under the name of Anomura, and by some has been regarded as a distinct order of Crustacea. Here it is however regarded as a group of the Phyllobranchiate division of the Macrura, "for undoubtedly in their earlier stages they pass through a morphological change that is essentially Macrurous, in which the scaphocerite and rhipidura are both present as well-devoloped appendages, the latter of which they never entirely lose."

This group will be reported on by Prof. John R. Henderson, although two new genera and several new species are described and figured in the present Report.

It only remains to mention that with the exception of two out of the 157 plates all have been lithographed from the original drawings of Mr. Spence Bate. By this fact the value of this Report is intensified, as the author has been able to describe and figure what he has seen with a clearness and distinctness which far surpasses in effect the most brilliant work of the cleverest of artists. In an appendix Dr. Hoek gives a description, with figures, of *Sylon challengeri*, a new parasite Cirriped.

Vol. XXV. also contains but a single Report, that on the Tetractinellida, by Prof. W. J. Sollas. Perhaps no department of zoology has made during the last twenty years such rapid progress as the Sponges, and it is astonishing to think of the large number of forms that have been very fully examined during this period. Certainly no group has benefited more largely by the researches made during the expedition of the *Challenger*, and it was the greatest good fortune that the collections made were submitted to such excellent workers as Polejaeff, F. E. Schulze, Ridley, Dendy, and Sollas. The joint Reports of these authors, and the splendid series of illustrations which accompany them, form a complete history of this group up to the existing state of our knowledge, a history which shows the worker what is not known as well as what is.

The last of these Reports treats of the Tetractinellida, and in an appendix of a small group of Monaxonida, about the exact location of which there was for long some doubt. In its monographic completeness it surpasses all the other Reports on the Sponges, while in the fullness of its morphological details it may well serve as an introduction to a knowledge of all the orders.

The Tetractinellid Sponges of the *Challenger* having been well preserved, it was possible to make a thorough investigation of their minute anatomy, a work involving an enormous amount of labour in the cutting of thousands of thin sections, and the separate examination of most of them. The number of species and varieties obtained by the *Challenger* was 87, of which 73 are new to science. These are arranged in 38 genera, of which 18 are new. in addition there are 221 species mentioned, making the total number of described species 294, and of accepted genera 81.

Dividing the Sponges into the two classes of the Megamastictora (with the single sub-class Calcarea) and Micromastictora, the latter is divided into the three subclasses of Myxospongiæ (Halisarca, &c.), Hexactinellida, and Demospongiæ. The subdivision of this last may be made primarily into two tribes : (1) the Tetractinellida, (2) the Monaxonida. The former may be characterized as Demospongiæ in which some or all of the scleres are tetraxons, triænes, or desmas. The name Tetractinellida was first proposed by Marshall (1876) in practically the same sense as it is used now by Sollas.

Into the details of the sub-orders and families of this tribe our space forbids us to enter. Their descriptions, with those of the genera, will be found in orderly sequence in the introductory chapter, while the descriptions of the species occupy 410 pages of the Report.

In an appendix we have an account of the Sponges belonging to the Spintharophorous sub-order of the Monaxonida, which, under the impression that they were more nearly related to the Tetractinellida, had been omitted from Ridley and Dendy's Report of the Sponges of this tribe.

The figures of the Sponges on the forty-four chromolithographic plates accompanying the Report were drawn by the well-known artist, T. H. Thomas, R.C.A. The Sponge portraits are really beautiful studies from the originals. The figures representing structure were first traced by the author with the camera lucida, and were then drawn by Mr. Thomas direct from the preparation under the microscope.

MATTHEW FONTAINE MAURY.

A Life of M. F. Maury, U.S.N. and C.S.N. Compiled by his Daughter, Diana Fontaine Maury Corbin. (London: Sampson Low, 1888.)

A MEMOIR of the illustrious founder of the science of the physical geography and meteorology of the sea, written by the tender and loving hand of his daughter, cannot fail to be of interest, not merely to that section of thinkers and workers who are engaged in the branch of science which Maury especially cultivated and adorned, but to the larger world who appreciate, and are benefited by, the perusal of the biography of a man of powerful and vitalizing imagination, disinterested labour for the public good, self-denying patriotism, and indomitable perseverance.

Family memoirs are too often apt to degenerate into a mere panegyric of public and private virtues, coupled with a disinterment of private matters which an unbiassed stranger would have too much tact and modesty to expose, and which often destroy all the effects of the accompanying eulogy. Mrs. Diana Corbin has, fortunately, succeeded in avoiding these pitfalls, and by a judicious blending of history, correspondence, and extracts from lectures, has enabled the reader to form his own judgment of the merits and services of her renowned father.

Descended from the French Huguenots on one side, and the English Protestants on the other, Maury seems to have united in his own person the lively imagination we unconsciously associate with the former, together with